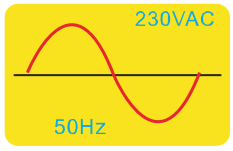
Solar Energy
westech

User Manual

WT Combi-S Pure Sinus Wave Inverter



1000W 2000W
3000W 4000W

Contents

1. Important Safety Instructions

1.1. Safety Instructions part 1

Wrong installation or false use of the inverter may cause problems, injuries or may result in serious damage to the equipment.
Please read the instructions very carefully. Especially pay attention to all instructions marked with “CAUTION” and “DANGER”!

WARNING! High voltage 230Vac!

Keep away from children!

- The inverter has the same potentially lethal Voltage like an average electrical socket. Don’t let your children play with it and be very careful when working with the inverter!
- There are no user serviceable parts inside of the inverter. Do not disassemble or attempt to repair the inverter by yourself.
- Do not expose the inverter to water, snow or other forms of humidity.
- Never connect the inverter to the alternating current of your household! This results in the destruction of your inverter even if it is turned off.

WARNING! Heated surface!

- The inverter casing can get very warm (60°C) Make sure, that there is at least 5cm free space around the inverter to allow air circulation.

WARNING! Risk of explosion!

- Never use the inverter in areas with inflammable or explosive gases and materials.
- Don’t use the inverter close to lead acid batteries. These batteries can produce explosive gases which can be ignited by a spark caused by short circuit or wrong wiring of the inverter.

1.2. Safety Instructions part 2

CAUTION!

- Don’t connect the alternating current of your household to the AC-socket of the inverter. If you do your inverter will be damaged or destroyed.
- Don’t connect any kind of wiring to the inverter where electrical grounding and neutral wire are connected.
- Don’t use the inverter in areas with an ambient temperature higher than 40°C.

CAUTION! Use the correct battery voltage!

- Only connect the inverter with batteries which have the same voltage as the inverter. (12V or 24V)
- Batteries with a voltage of 24V will damage a 12V inverter.
- Batteries with a voltage of 12V won’t damage a 24V inverter but won’t work either.

2. Product features

Thank you for buying the WT Combi-S Pure Sinus Wave inverter from Westech-Solar.
This product is a compact and mobile Pure Sinus Wave inverter with practical and modern design. The inverter can supply your AC-consuming electrical devices such as television, refrigerator and lighting directly of the 12Vdc/24Vdc/24Vdc batteries.
It is designed for a long life and incident free operation.
The integrated, automatic safety-monitoring guarantees protection from overload and under voltage of your batteries.

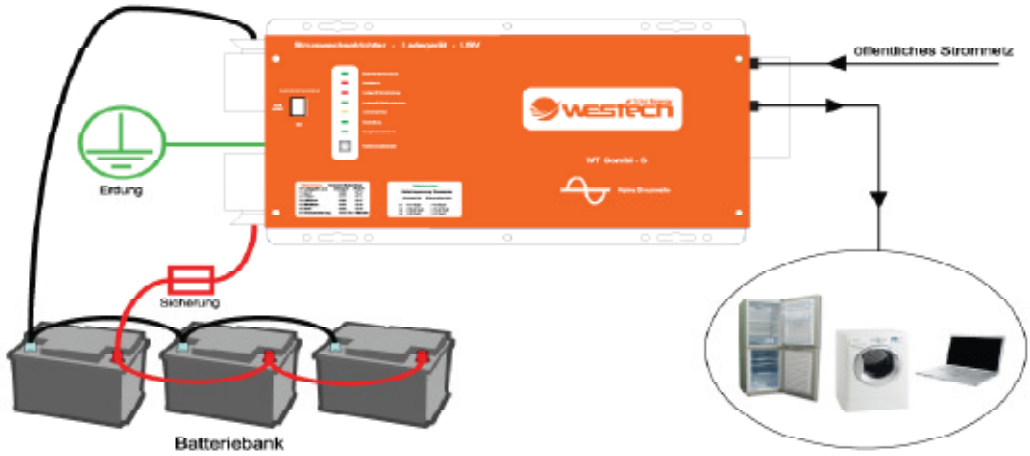
Please read the Instructions carefully before installing the inverter and keep them as a reverence for the future.

- Pure Sinus Wave inverter, integrated battery charger with adjustable charging current
- 4-step progressive charging system for 7 different battery types
- Easy to install and easy to use
- Automatic network switching between mains operation and battery operation
- Microprocessor controls guarantee high reliability
- Remote control
- Bypass without battery connected
- Power saving function

2.1 Safety features

- safety shutdown: inverter overload protection
- safety shutdown: battery overload protection after alarm signal
- safety shutdown: overheating protection
- Short circuit protection

3. Connection



Safety fuses:

1000W	12V / 24V	100A / 100A
2000W	12V / 24V	200A / 100A
3000W	12V / 24V	250A / 150A
4000W	24V / 48V	200A / 100A

Wire cross section:

Wire length	40A	80A	125A	160A	250A
1m	16mm²	25mm²	35mm²	35mm²	70mm²
2m	25mm²	35mm²	70mm²	90mm²	90mm²

3.1 Connection 230Vac input/output

On the following pictures you can see that that the alternating current input and output sockets of the WT Combi-S 1000W and 2000W are different to the clamp-connections of the WT Combi-S 3000W and 4000W. The reason is that in the latter case there may be currents up to 15-25Ampere.

CAUTION! Never connect the inverter AC-output with the electricity network of your house!! This will result in destruction of your inverter.

The electricity network may only be connected to the input connection (on the lower left on the following picture). Connection and installation of the inverter may only be done by authorized personal. For the AC-connection use a flexible wire with a wire cross section of at least 1,5mm² to 2,5mm². Ground your inverter via your AC-connector cable.
Also ground the inverter casing.

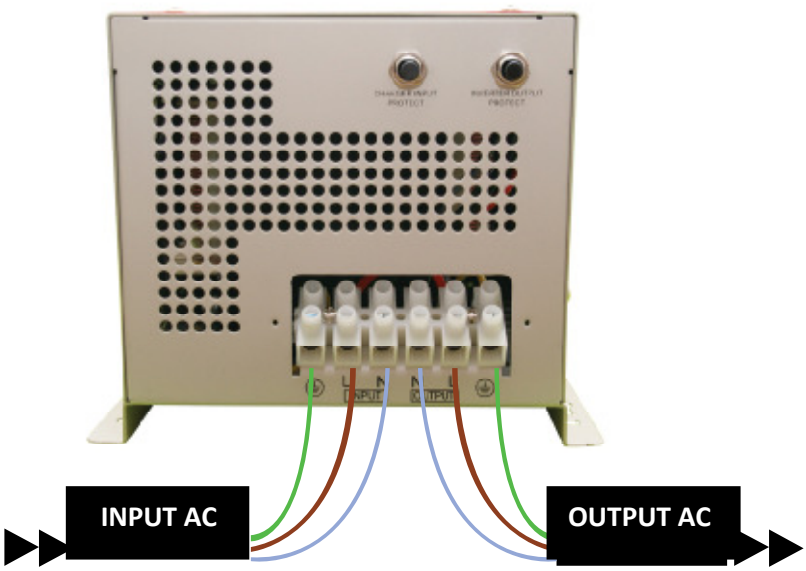
3.1.1 AC-Connection for 1000W and 2000W

Extern AC-input connection →

Inverter 230Vac output

← grounding

3.1.2. AC-Connection for 3000W and 4000W



4. Checklist

1. Make sure that the input voltage(dc) of the inverter is the same as the battery voltage of your system. (12V , 24V or 48V)
2. Place the inverter as close to the batterie(s) as possible. The shorter the cable, the less cable loss.
3. Be careful to get the polarity right! Connect the red cable with the positive connector and the black cable with the negative connector of the inverter. Do the same with the battery. Reverse polarity might destroy the inverter!
4. Never use the inverter in areas without enough air circulation, to much humidity or in areas with ambient temperature above 40°C. Make sure that no children, inflammable substances or gases can get near the inverter.
5. Always turn on the inverter first, before turning on the load.
6. Never connect the inverter AC-output with the electricity network of your house! This will result in destruction of your inverter.
7. The inverter may only be installed and connected by authorized personal.
   Only install the inverter if you have read the manual and understood it.

5.Installation

1. Install the inverter near the Battery.
2. The installation position is variable.
3. Only install in cool and dry environment
4. Either use the standard connection cable of your supplier (length 1m) or use your own one. Refer to page 5 if you don't know what cable you will need for your system.
5. Install a high current fuse between inverter and battery to prevent short circuits and equipment damages.
6. Install the fuse between battery and battery cable. In case of a short circuit in the cable your battery is protectet.
7. Make sure that the inverter is turned off during the installation.
8. Also make sure that no load or extern source of power is connected to the inverter. Install RCD and make sure that there is a high enough fuse on the AC side of the inverter so that none of your devices and equipment can be damaged.
9. Only use three-conductors for the installation.
10. Before powering the inverter make sure that the right battery type is selected, otherwise the software can't adapt the charge current correctly.

6. Charge chracteristics

6.1 Bulk charge

In this stage the Battery is nearly completely discharged. The inverter will bring the battery voltage back to level where it can be boost charged. In this stage the battery will be charged with maximal voltage until battery voltage is 0.3V lower than the maximal voltage.

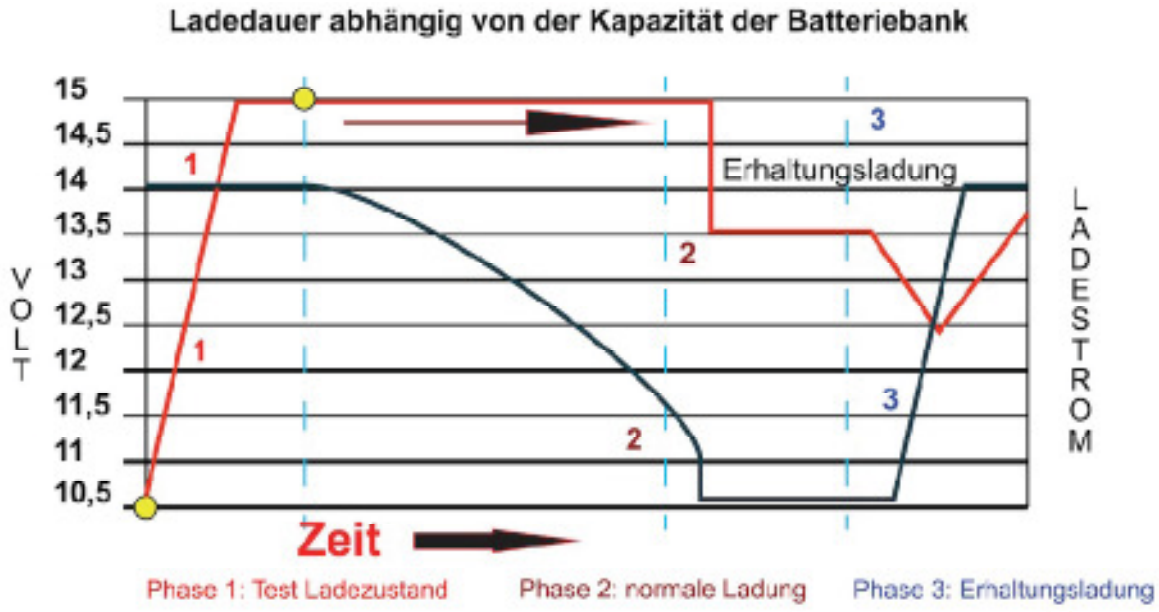
6.2 Boost charge

In this stage the battery will be held at maximum voltage level while slowly reducing the charge current until the battery is fully recharged. The timer reaches from one to ten hours.

6.3 Float charge

Float charging the battery keeps it at the maximum capacity. If the battery voltage drops under 12/14V the inverter will start the charging process again.
After 10 days the inverter will automatically repeat the charging process.

6.4 Charging characteristics diagram



double the voltages for 24V systems

There are so many battery types, that it might sometimes be very confusing: GEL1, GEL2, AGM, LIFEPO4
We tried to integrate all charging information of the most important battery producers in Europe and the U.S.A. but it was very difficult because apparently there is no universal answer or solution. Therefore we can only offer a general approach which we cannot guarantee for. If you do not know what settings to make, ask your battery producer which charge current you should use. If you are still not sure, better choose a lower charge current than a higher one.

Equalization Charge can be very dangerous if you do not know what you are dealing with. Before using this type of charge make sure that you know what it is for and what could happen to your battery.
Equalization Charge can remove sulfation which may have formed during low-charge conditions. This can increase the capacity of a deeply discharged battery.
The sulfation is destroyed by applying a very high voltage to the battery, which may even be destroyed in the process.

6.5. Equalization Charge

This function may only be used with lead acid batteries.

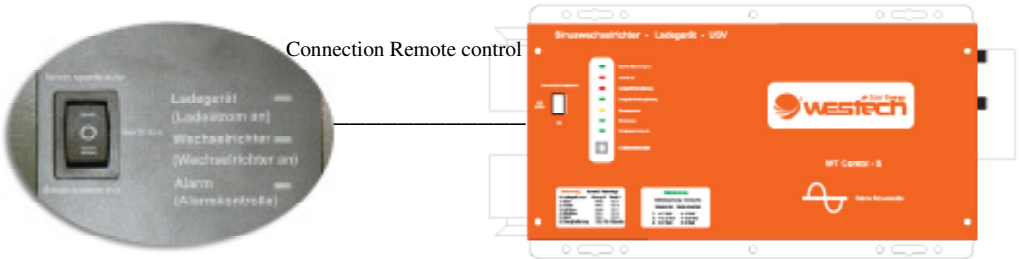
1. Make sure that the battery is not connected to anything except the inverter. Otherwise the high voltage might destroy or damage load and electronics.
2. Make sure that there is enough air circulation where your batteries are.
3. Select “Equalization Charge” (6) at the battery switch and turn on the inverter.
4. For safety reasons there is a maximum charge time of 4 hours. If you are using many batteries you may need to use it again to successfully charge your batteries.
5. The following will happen if you start equalization charge:
   It is highly recommended to watch over your batteries during the recharge time. After starting the process, battery voltage should climb above 15,5V because the batteries cannot charge properly due to sulfation. After one or two hours, the voltage should start dropping slowly if the process was successful.
   Voltage can drop to 12,5V until it rises again which indicates that desulfation was successful. Turn off the inverter now and select your battery type to fully charge your battery. It may be that you have to repeat the process to achieve results.

Remember, this is a professional tool and operation which can often restore some battery capacity. It does not work on, or repair really broken batteries.

Please attend to your batteries during equalization charge. The batteries can reach high temperatures during this operation. If the temperature exceeds 50°C **immediately STOP** the process and let the batteries cool down.

7. Remote Control

The inverter can also be turned on or off by remote control.
The remote control is optional and is connected to the RJ12 port on the backside of the inverter. Now you can operate the inverter also from another room.



Caution! If you intend to use the remote control, the inverter’s power switch must be switched to “OFF/RESET”. It will not work if otherwise.

8. Operation

1. After the inverter has been connected to the batteries, but NOT to 230Vac input current, turn it on. Now it should start the test routine while all LEDs are flashing. After the short test, the inverter is fully operational and should start to produce 230Vac output voltage (if the batteries have more than 11Vdc/22Vdc).
2. If everything is working as described above, connect the inverter's 230Vac input with your external 230Vac power source.
3. After about 20 milliseconds the inverter switches from battery operation to mains operation.
4. If a battery type is selected, the internal battery charger will start charging the batteries. If "0" is selected: → battery charge is off
   If "7, 8, 9" is selected: → battery charge is off, battery operation until batteries fall below 11Vdc/22Vdc

9. LED and Operation Display

10. Function Switch

10.1. Battery Charger

The WT Combi-S has an integrated battery charger. The batteries will be charged as soon as the inverter is connected to your external 230Vac power source which then also supplies the load. The battery charger is activated through the Function Switch. ("0" → off)

10.2. Function Switch

Adjustable battery types:

1. Gel 1 start 14,0V (28,0V) end 13,7V (27,4V)
2. AGM start 14,1V (28,2V) end 13,4V (26,8V)
3. LiFePo4 start 14,6V (29,2V) end 13,7V (24,4V)
4. Lead-Acid start 14,4V (28,8V) end 13,6V (27,2V)
5. Gel 2 start 14,4V (28,8V) end 13,8V (27,6V)
6. Desuphating 15,5V(31V) 4 hours

If these functions are selected, the inverter has priority as was described in 10.1.

10.3 Maximum charge current

The integrated battery charger will charge the batteries with 70A (35A if using 24V inverter). If you want to limit the maximum charge current, you can do so with the DIP-switch on the back of the inverter. You can choose between 4 options, depending on how much current you would like to have: 25%, 50%, 75% and 100%.
Factory made the charge current is 100%.
If you want to change the maximum charge current to 25% you would have to put all the switches to the left.

10.4 Battery priority

There is also the option to use power from the batteries to supply your load instead of using AC mains power. If this option is selected, battery power (gathered by a PV-system for example) is consumed first. Only if the battery voltage gets low, the inverter will switch instantly to mains operation and supply the load through it

If the batteries get charged above reconnect voltage the inverter will switch back again and continues to supply your load with battery power.

The Battery priority option can be selected with the Function Switch:
"7, 8, 9" → Battery charger is off, Battery priority is on
Each option has different reconnect and disconnect Voltages.

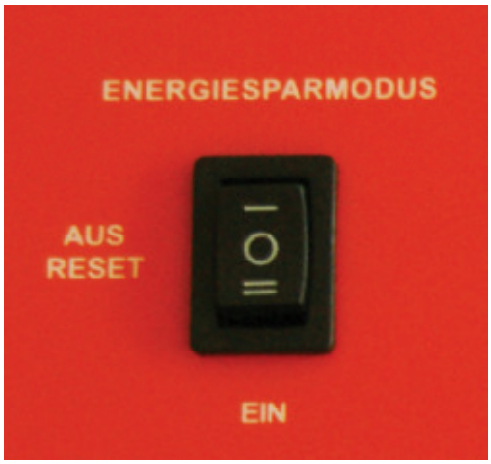
disconnect and reconnect Voltage:

7: battery disconnect: < 12,0V (24V) reconnect: 14,0V (28V)
8: battery disconnect: < 11,5V (23V) reconnect: 13,5V (27V)
9: battery disconnect: < 11,0V (22V) reconnect: 13,0V (26V)

10.5. Operation Mode

("power saver auto" ← → "power saver off")

The inverters operation modes are selected with the main switch:



1. "power saver off" – "EIN": inverter is operating all the time, consuming some energy from the battery.

2. "power saver auto" – "ENERGIESPARMODUS": Every 30 seconds the inverter will test, if 230Vac load is connected. If so, the inverter will automatically turn on and supply the load with power. When the load is disconnected the inverter will check for further 30 seconds if any load is connected and if not, will return to "power saving" modus again.

3. "AUS/RESET": The inverter is turned off. Choose this setting if you want to operate the inverter with the remote control!

When using the "power saver" function the inverter will only activate if the required load power exceeds 30W!
There may be difficulties with some kinds of refrigerators; the refrigerator may not be able to turn on, because it takes to long until the inverter switches from "power saver" to "operating" status (can take 1-30 seconds).

11.1. Technical Data 1

Technical Data	**WT Combi-S**					
Input voltage	230V pure sinus wave					
Nominal voltage	230Vac					
Low voltage disconnect	184Vac/154Vac +/-4%					
Low voltage reconnect	194Vac/164Vac +/-4%					
Overload disconnect	253Vac +/-4%					
Overload reconnect	243Vac +/-4%					
Maximum input voltage	270Vac					
Nominal input voltage	50Hz (auto dedect)					
High frequency shutdown:	47Hz					
Low frequency shutdown:	55Hz					
Output voltage	Same as input voltage					
Overload protection	Fuse					
Short circuit protection	Fuse					
Load switch	30 Ampere					
Efficiency	90% +					
Switch: battery/mains operation	10ms nominal					
Bypass without battery	Yes					
Max bypass current	30 Ampere					
Bypass overload	35 Ampere alarm					
Inverter Specification / output AC						
Output voltage	Pure sinus wave					
Rated nominal power	1000W	2000W	3000W	4000W	5000W	6000W
Efficiency factor	0.9-1.0					
Output voltage	230Vac					
Tolerance	+/- 10% RMS					
Output frequency	50Hz +/- 0.3Hz					
Nominal efficiency	>92%					
Maximal power						
Short circuit protection	yes, fault after 10 seconds					
Inverter Specification / input DC						
Nominal input voltage	**12V**	**24V**	**48V**			
Minimum input voltage	10V	20V	40V			
Alarm signal low voltage	10,5V	21V	42V			
Low voltage disconnect	10V	20V	40V			
Over voltage disconnect	16V	32V	64V			
“Power saving” self consumption	0,2W					
“Power saving” selection	Function switch at inverter / remote control					
Batterie charger Specifications						
Input voltage	194Vac-243Vac					
Output voltage	Depending on selected battery type					
Maximal charge current						
Battery starting voltage	0-15.7Vdc at 12V (*2 if 24Vdc (*4 if 48Vdc))					
Overload shutdown	15.7Vdc at 12V (*2 if 24Vdc (*4 if 48Vdc))					

11.2. Technical data 2

Technical Data	WT Combi-S			
	Boost charge		Float charge	
Battery Type				
Gel 1	14.0Vdc		13.7Vdc	
AGM	14.1Vdc		13.4Vdc	
LIFEPO4	14.6Vdc		13.7Vdc	
Lead-Acid	14.4Vdc		13.6Vdc	
Gel 2	14.4Vdc		13.8Vdc	
Equalizing charge	15.5Vdc for 4 hours			
Remote control	Optional			
Dimensions in mm	1000W/2000W/3000W model: 442 x 218 x 179 4000W model: 598 x 218 x 179			
Weight	1000W 20kg	2000W 22kg	3000W 26kg	4000W 35kg

12. Customer Service

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